

ProRail

Putting energy in switch heating

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May, 20, 2009: MIT

Revised MIT climate model sounds alarm

New analysis shows warming could be double previous estimates in the next century, which twice as severe as previously estimated by MIT six years ago.

Global poll finds 73% want higher priority
for climate change (The Guardian, July, 30, 2009)

Britons among the most enthusiastic about action to stop global warming, while Americans among least willing to put environment first, according to global public opinion poll



Energy saving program Dutch Railways

- Energy consumption of the Dutch Railway sector is about 13.300 TJ. This is 3% of the national energy consumption.
- More than 90% of the energy consumption in the Dutch railsector is used for traction. About 1100 TJ is used for non-traction.
- In 1997 the Dutch Railways and the minister of public transport closed an agreement to improve the energy efficiency with 20% till 2010.

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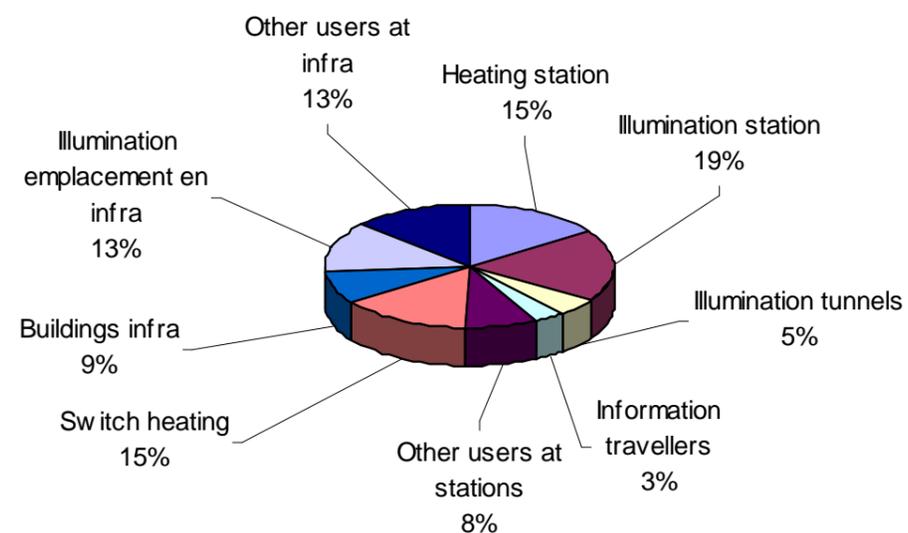
A few figures

ProRail maintains 6.583 km track and about 120 railway yards. ProRail manages 392 stations. There are 80 new stations under constructions or planned to be build before 2016. A growth of 20%.

Use of energy 2008:

- 95 mln kWh electricity (22% green)
- 8 mln m³ natural gas
- 1100 TeraJoule
- 45.000 ton CO₂

Figur 2: energy consumption ProRail / NS poort stations
per category percentage of TJ



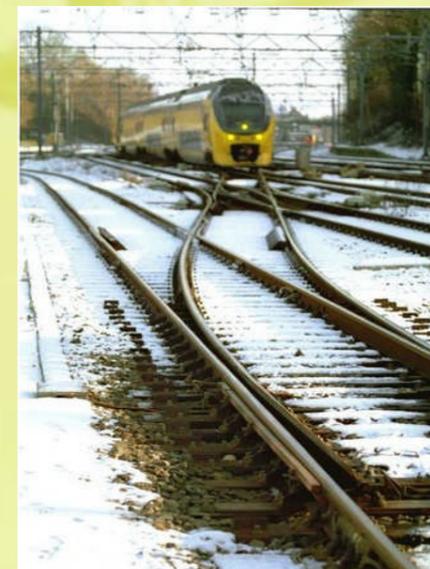
Ambitions ProRail

- ProRail emits in 2012 12% less CO₂ than in 1997.
- Every two year ProRail makes an energy saving plan for the infrastructure and railway stations. At this moment EBP4 2009 – 2010.
- In 2020 we improve our energy efficiency with 30% compared to 2005.
- Goals EBP4:
 - anchor improvement energy efficiency in the organization
 - carry out feasibility studies and pilots
 - improve energy registration and measure energy consumption
 - take measures in regular maintenance
- Long-term goals are:
 - improving the energy-efficiency with more than 2% per year
 - buying 100% green electricity
 - encouraging contractor, suppliers and engineers to develop more energy efficient and sustainable products.

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Main projects 2009 – 2010

- Research project to save energy used by switch heating and thermal insulation of switches in cooperation with GVB Amsterdam and SenterNovem. TU Eindhoven and MeteoConsult are the researching partners.
- Develop an assessment tool for sustainable stations
- Dimming light in tunnels (savings 1.1 mln kWh/yr)
- Several other studies:
 - energy neutral station
 - improve the energy efficiency of platform lighting with 30%
 - energy efficient escalators
 - CO₂ footprint ProRail



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Research project switch heating

- Switches are responsible for 15% of the energy consumption of ProRail and almost 20% of the greenhouse gas emissions.
- Natural gas is the primary energy source for Dutch switch heating.
- Three type of switch heating:
 - burner pipe (gas, 45%)
 - electric heating elements (25%)
 - central heating (gas,heatpump or electricity, 30%).
- Control with weather stations.
- With GVB Amsterdam, SenterNovem, TU Eindhoven.
- Using a computer model of a switch to determine the important factors.
- Test program with a complete switch in a refrigerated warehouse.
- Focus on improving insulation and control of the heating.



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Assumptions that are being tested

- It is possible to reduce the energy consumption of electric heated switches with 20% using a control based on weather forecast.
- Insulation of switches can reduce the energy consumption with another 20%.
- A more logical placement of heating elements, or splitting one big element in two separate ones, delivers the heat on the place where it's needed. This reduces energy consumption.
- Surface improving measures, improve the transport of heat from the heating element to the rail, resulting in energy saving.
- All these measures do not affect the maintainability and reliability of the switches.
- Payback time of the measures do not exceed 10 years.

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Test program

1. ProRail and GVB Amsterdam declare the test program, based on the previous assumptions.
2. TU Eindhoven and MeteoConsult make a computer model, to simulate this test program.
3. The results from the model are verified in the refrigerated warehouse.
4. The test results are improving the computer model.



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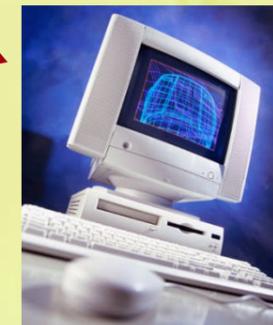
Insight into the testing method



Worst case weather scenario by Meteo Consult

The meteorological quantities of this scenario are being fed to:

An simulating computer model,
made by TU Eindhoven.

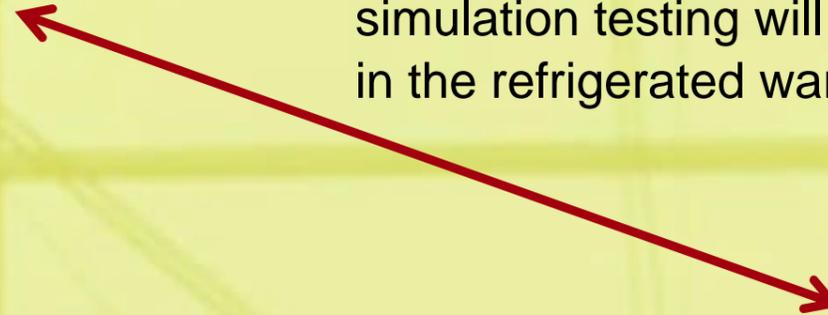


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Insight into the testing method



The test results of the computer simulation testing will be verified in the refrigerated warehouse test.



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What do ProRail and GVB get?

- A verification of possible energy reducing measures, including the percentage of energy reduction and an estimation of the economic payback.
- An insight into the application, and the practicality of those energy reducing measures.
- An estimation of the fact that the measures taken will not affect the availability, maintainability and reliability of the system.



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Next step

- Implementation of the results into our rail system.
- Tests in real situations (maybe in other – colder – countries)
- Opportunities for and tests with switch heating which are using heat pumps

QUESTIONS ??

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